

Applicant: Schrauwers
Application No.: Unassigned
Filing Date: Herewith
Docket No.: 903-131 PCT/US
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A. Amendments to the Specification:

Please amend the title beginning at page 1, line 3, as follows:

~~Short title:~~ Printing cylinder supporting unit, use of printing cylinder supporting unit, and printing machine provided with printing cylinder supporting unit.

Please add the following immediately after the title of the invention:

CROSS-REFERENCE TO RELATED APPLICATIONS:

This application is the National Stage of International Application No. PCT/2003/000627, filed September 9, 2003, which claims the benefit of Netherlands Application No. NL 1021417, filed September 9, 2002, the contents of which are incorporated by reference herein.

Please add the following new paragraph immediately prior to page 1, line 7, and after the Cross Reference to Related Applications, as follows:

FIELD OF THE INVENTION:

Please add the following new paragraph immediately prior to page 1, line 10, as follows:

BACKGROUND OF THE INVENTION:

Please amend the paragraph beginning at page 1, line 10, as follows:

~~Such a~~ A printing cylinder supporting unit is known from EP-0864421-A1. This publication discloses a printing machine with exchangeable ink application means. Such a printing machine comprises several printing units, in the case of which each printing unit fulfils a separate function in the overall printing process. Such printing units can be suitable for several different types of printing, with different pattern repeat lengths and suitable for various printing techniques such as rotary silk-screen printing, intaglio printing, letterpress printing and flexographic printing. A printing unit generally comprises a printing cylinder and ink application

means. In the operating state the printing cylinder makes contact along a describing line on the surface of the cylinder - the contact line - with a substrate that is to be printed. Ink is applied by way of the ink application means to the inside, or directly to the outside, of the printing cylinder.

Please amend the paragraph beginning at page 1, line 36, as follows:

In the prior art it is possible to exchange printing cylinders. The reason for changing a printing cylinder may be that a different pattern repeat length has to be printed, and it is advantageous to use a printing cylinder with a different diameter for this purpose. A printing cylinder can also be changed in order to change the printing technique. In order to exchange a printing cylinder, two rollers can move outwards along a track indicated diagrammatically by arrows A in ~~Figure~~ FIG. 11 of the abovementioned patent specification. It is known from practice that such tracks A are produced, for example, by the fact that the rollers are rotatably fixed on swivelling arms, in the case of which the swivel pin of the swivelling arms can, if necessary, undergo a rectilinear translation in its entirety.

Please add the following new paragraph immediately prior to page 2, line 35, as follows:

SUMMARY OF THE INVENTION:

Please add the following new paragraph immediately prior to page 6, line 20, as follows:

BRIEF DESCRIPTION OF THE DRAWINGS:

Please amend the paragraph beginning at page 6, line 20, as follows:

The principle and a preferred embodiment of a preferred embodiment according to the invention will be explained in greater detail with reference to the appended drawings, in which:

Figure FIG. 1 shows in side view a diagrammatic view of a preferred embodiment according to the invention;

Figure FIG. 2 shows in side view the main parts of a preferred embodiment according to the invention, in the operating state;

Figure FIG. 3 shows in top view the main parts of a preferred embodiment according to the invention, in the operating state;

Figure FIG. 4 shows a side view of Figure FIG. 3;

Figure FIG. 5 shows a cross section along V-V of Figure FIG. 3.

Please add the following new paragraph immediately prior to page 6, line 34, as follows:

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS:

Please amend the paragraph beginning at page 6, line 34, as follows:

The ~~figures~~ FIGS. show an exchangeable printing cylinder 1, the surface 2 of which is suitable for the transmission of inking means (not shown) to a substrate 3. In the preferred embodiment the substrate 3 is wedged between the printing cylinder 1 and an impression roller 4. The printing cylinder 1 is provided with a bearing ring, the bearing surface 5 of which is indicated diagrammatically in both ~~figures~~ FIGS.

Please amend the paragraph beginning at page 7, line 4, as follows:

During the printing process the substrate 3 is conveyed along the rotating printing cylinder 1. In the process the substrate 3 is in contact with the printing cylinder 1 along a describing line on the surface 2, the contact line 6. The printing cylinder 1 is mounted by way of supporting bearings 11, 12 and 13, which in the preferred embodiment are in the form of rollers 11.1, 12.1 and 13.1. The supporting bearings 11, 12 and 13, or the bearing rollers 11.1, 12.1, 13.1, are in contact with the bearing surface 5 of the bearing ring at a distance that is equal to the radius of the bearing surface of the bearing ring, or half the diameter D_B , measured from the centre line M of the printing cylinder. Supporting bearing 12 lies at an angle α_{12} along the bearing surface 5 of the bearing ring. Said angle is defined in a polar coordinates system, in which M is the pole, and the O-axis is defined by a reference axis 7, which runs from the contact line 6 through the centre M. The positive direction of this reference axis 7, and thus the definition for $\alpha=0$, points away from M of the substrate 3, as shown in Figure FIG. 1 by an arrow

point on the end of axis 7. In a comparable manner bearing point 13 lies at an angle α_{13} along the bearing surface 5 of the bearing ring. Bearing point 11 lies exactly on the reference axis 7, with the result that the angle α_{11} for this bearing point is equal to zero and cannot be shown in the ~~figure~~ FIG.

Please amend the paragraph beginning at page 7, line 29, as follows:

When the printing cylinder 1 is to be changed, the supporting bearings move outwards along the dotted lines 21, 22 and 23, the line 21 coinciding with the reference axis 7. The movement lines 21, 22 and 23 intersect each other at a reference point 25 and lie at an angle that is equal to half the α value of the supporting bearings concerned, as shown in the ~~figure~~ FIG. by $1/2\alpha_{12}$ and $1/2\alpha_{13}$. For supporting bearing 11 it again applies that its value of α is equal to zero, and it is therefore not shown in the ~~figure~~ FIG.

Please amend the paragraph beginning at page 8, line 1, as follows:

During the insertion of a printing cylinder 1 with an arbitrary cylinder diameter D_P the supporting bearings 11, 12 and 13 move inwards along the lines 21, 22 and 23 until they come into contact with the bearing surface 5 of the bearing ring of the printing cylinder 1 concerned. Thanks to the position and orientation of the lines 21, 22 and 23, the supporting bearings 11, 12 and 13 will always ultimately lie at the same angle α relative to the centre line of the printing cylinder 1, irrespective of the diameters D_P and D_B of the printing cylinder 1 and the bearing surface 5 of the bearing ring. By making sure that in the case of the printing cylinders with different diameter D_P the same difference in diameters is actually kept between the printing surface of the printing cylinder and the bearing surface D_B , as is usual in the prior art, it will be ensured that the contact line 6 of the printing cylinder 1 ultimately lies at the same position relative to the supporting frame, and therefore in the operating state always at the same position relative to the substrate 3 and the impression roller 4. In ~~Figure~~ FIG. 1 reference numeral 26

indicates the distance of the bearing surface 5 from the surface 2, the measurement 26 being half the difference between the diameters D_P and D_B .

Please amend the paragraph beginning at page 8, line 24, as follows:

In the preferred embodiment shown in Figures FIGS. 2 - 5 the movement of the bearing rollers 11.1, 12.1 and 13.1 is guided by movement means, comprising straight grooves 21.1, 22.1 and 23.1, which are cut out in the supporting or bearing frame 27, which for the sake of clarity is not shown in Figure FIG. 2. These grooves form an angle of 0° , 60° and -60° respectively with the reference axis 7. This means that the bearing rollers 11.1, 12.1 and 13.1 always come into contact with the bearing surface 5 at positions 0° , 120° and -120° respectively, measured along the circumference of the bearing surface 5. Pins 30 and 31 are accommodated in the grooves 21.1, 22.1 and 23.1, for the purpose of guidance. The pins 31 lie in line with the shafts 32 for the bearing rollers 11.1, 12.1 and 13.1.

Please amend the paragraph beginning at page 9, line 16, as follows:

Additional gear racks 60 are provided along the grooves 21.1 for purposes of parallel guidance. This parallel guidance ensures by means of a rod 61 and gearwheels 62, which mesh with the gear racks 61, that the bearing rollers assume the same position at the two axial ends of the printing cylinder. The impression roller 4 is connected by way of an axial bearing 70 to an impression roller frame 71, which for the sake of clarity is shown only in Figure FIG. 3.

Please amend the paragraph beginning at page 9, line 24, as follows:

Figures FIGS. 2 - 5 show the operating state in which the printing cylinder 1 is supported by the roller bearings 11.1, 12.1 and 13.1. In order to permit changing of the printing cylinder 1, the pneumatic cylinder 55 will pull the lever 50 to the left, with the result that the bearing roller

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11.1 likewise moves to the left. At the same time the rods 42 and 43, which are rigidly connected by means of the triangular plate 40 to the bearing roller 11.1, likewise move to the left. At the position of the grooves 22.1 and 23.1 for the roller bearings 12.1 and 13.1 this movement of the rods 42 and 43 divides into two directions. The first direction lies in the longitudinal axis of the rods 42 and 43 and results in a sliding movement of the rods 42, 43 through between the pins 30 and 31 and the connecting piece 45. The second component of the movement results in a movement in the direction of the grooves 22.1 and 23.1. This component of the movement pushes the pins 30 - and by way of the connecting piece 45 likewise the pins 31, the shafts 32 and the bearing rollers 12.1 and 13.1 - outwards. As a result of this, the printing cylinder 1 is released and can be removed in a manner known to the person skilled in the art.

Please amend the section description for the claims on the top of page 12, as follows:

WHAT IS CLAIMED IS: ~~Claims~~